A two-mode model of humor apprecation : Its relation to aesthetic appreciation and simplicity-complexity of personality

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Responding to a humorous stimulus is probably the most frequent behavioral category in the domain of humor. We are more often confronted with humor than we, for example, create it, reproduce it, or use it to alleviate tension or stress. Every day humor is presented in most newspapers and on radio and TV throughout the world; humor is orally transmitted in social settings at work and leisure. Because of its desirable effects, it is added to processes that are not inherently humorous, such as selling, education, or funeral speeches. While people can actively seek out humor sources by buying humor books, spending time with entertaining people, or going to comedy clubs, humor appreciation is by nature *receptive.*

Most general theories of humor relate to appreciation, providing a better basis for building personality models for humor appreciation than for other facets of the "sense of humor". The first instruments to assess sense of humor were based on appreciation of cartoons and jokes, and the role of personality in humor was most extensively studied for the domain of appreciation ("what is funny to whom and why?"). The idea that humor preferences tell us something about personality is old ("Men show their character in nothing more clearly than by what they think laughable." Johann Wolfgang von Goethe) and has been utilized in personality assessment as part of objective tests and also in clinical practice for more than 40 years.

In the present chapter we discuss the general issues in studying humor appreciation from a personality perspective and present the essentials of one current approach (for the development of the taxonomy, construction and evaluation of the assessment instrument, and personality studies the reader is referred to the review by Ruch 1992). Then we discuss the implications for personality studies that arise from the view that humor appreciation is a form of aesthetic behavior and present three studies relating appreciation of the humor structure to aesthetic preference. Finally, an outlook on necessary studies and possible future developments is given.

Humor appreciation as a personality characteristic

The process of perceiving, processing, and responding to a humorous stimulus is complex and involves many areas of psychic functioning, such as cognition, emotion, and motivation. For a more comprehensive account of humor appreciation, many factors relating to the humorous message, the sender, the receiver, their relationship, physical and social factors of the situation, etc., have to be considered. However, not all are relevant for a personality approach to humor appreciation. For example, while a skilled joke teller will optimize the humorous effect for the receiver, a poor joke teller might spoil the perceived funniness of the identical joke. Likewise, reading jokes in solitude might rarely evoke laughter, while a laughing companion might enhance the degree of expressiveness. These factors, however, are peripheral, and only relevant if they interact with the personality of the recipient (i.e., if they reliably affect some people more strongly than others).

Three prominent modes of humor appreciation. The conceptualization of habitual individual differences in humor appreciation has primarily involved the development of taxonomies in the modes of *stimuli*, *responses*, and *persons*, leaving out the other factors. The study of the *stimulus mode* has received the most attention. There were intuitive and theory-based approaches to taxonomy, but also factor analytic studies have been carried out to determine the number and nature of types of amusing stimuli. Here, a person's "sense of humor" was then defined by his or her location on the various dimensions. Several factors impede the search for a *comprehensive* taxonomy of humor stimuli. First, humorous material may differ on several dimensions, such as form (e.g., verbal vs. graphical vs. pantomime) or length (jokes vs. short stories vs. humorous prose) and some of these categories are not suitable for economical study. Typically, only stimuli of one or two categories have been studied simultaneously (a review of these studies is given in the chapter by Martin this volume); however, there is evidence that the resulting factors transcend the formal categories (for example, jokes, limericks, cartoons or incongruous photographs do load on the same factors). Second, even within categories there is an innumerable number of potential humor stimuli to be studied. However, in order to be comprehensive at the trait level, indicators must be comprehensive. Thus, it is necessary to define the scope of the taxonomy (i.e., define the universe of items to be covered) and then develop rules ascertaining that the sample drawn from the population of humor stimuli is representative.

The mode of *responses to humor* should receive close attention as well since the number and nature of the stimulus factors may depend on the type of response employed (e.g., Abelson & Levine 1958), and the number and nature of the response dimensions are of interest as part of the individual's humor appreciation profile. If

important components are overlooked, the description of the person's humor response style remains incomplete. Hence we must identify prototypical responses and study their dimensionality. We are still lacking a complete list of possible responses to humor stimuli; nevertheless, fine-grained analysis of facial behavior (via facial EMG and coding systems) in response to jokes and cartoons, funny video and audio tapes, a jack-in-the-box gag, and also to lifting incongruous weights shows that the range of responses far exceeds smiling and laughter (e.g., Keßler & Schubert 1989; Ruch 1995c). Also, when Ruch and Rath (1993) asked participants to freely describe their immediate responses to a joke, they did not only use positive terms but also negative ones referring to both stimulus properties *and* personal feelings; and included both cognitive *and* affective qualities of their own feeling state (or structure-related vs. content-related stimulus aspects).

Third, the response part of humor appreciation needs to receive more *theoretical* attention than before. What is the *nature* of the response to humor? Is it an emotion, perhaps an aesthetical emotion (Frijda 1986), feeling, quality of perception, or a purely cognitive response? This issue is not discussed and too often the response is reduced to its technical aspect and treated as a "judgment", "rating", or "scaling" behavior. Of course, technical considerations are of interest, too; for example, an ipsative answer format (e.g., using a paired comparison or instructing subjects to use "funny" and "dull" equally often; as in the IPAT humor test of personality by Cattell & Tollefson 1966) assumes that subjects mainly differ in *type* of humor preferred and there are no overall differences in the amount or quantity of humor appreciation. While the latter clearly contradicts everyday experience, on the plus side this does circumvent some of the known rating artifacts. Also, this approach hinders the extraction of a few potent factors and facilitates the extraction of many but narrow factors.

Finally, the response mode is also affected by the perceived nature of humor appreciation. When humor appreciation is viewed as a "style", or a typical behavior, then a mere description of the response will suffice. However, humor appreciation may be perceived as a category of "taste", with an optimal discrimination among types of humor being important. In such a case one would score maximally if one finds the "right" humor funny and the "wrong" one not funny. Such a criterion typically is set by the "norm" or average answers of a group (e.g., Eysenck 1952) or is based on the judgment of "experts". A dimension of good vs. bad taste, however, clearly goes beyond description and needs a sound rationale and solid criteria. To complicate things even more, some authors defined humor appreciation as an "ability" (e.g., "the ability to understand and enjoy messages containing humor creativity...") and indeed we all know when we have not "got" the point. Not surprisingly, researchers have examined whether the recipient fails to understand the joke at all (i.e., is unable to give any explanation) or fails to give an explanation that the ex-

perimenter considers to be the "correct" one, or that represents a desired perspective of the intention of the joke or cartoon. Indeed, experimenters who ask people to explain a given joke are surprised at the many interpretations of a single joke. It is also commonly observed that subjects find control cartoons (non humorous drawings, or cartoons with removed captions) funny (for a discussion of different views of the nature of humor appreciation see the chapter by Derks et al. this volume).

The *person* mode has received attention in two ways. First, types of people were clustered according to their similarity of responses to humor. Both Eysenck (1942) and Ruch (1980) intercorrelated persons (rather than stimuli) and extracted person factors. There is some resemblance in these factors; for example, there was always a bipolar factor opposing people who show a preference for sexual humor over structure-dominated (non-sexual) humor and people who prefer non-sexual over sexual humor. Likewise, the Eysenckian "simple as opposed to complex jokes" resembles the type factor that primarily distinguished between appreciation of incongruity-resolution and nonsense humor (see below). Second, in addition to these *qualitative* differences among people, *quantitative* differences in humor appreciation were considered (even more often so). Numerous studies tried to relate individual differences in humor appreciation to other domains of personality, such as temperament, intelligence, values, attitudes, or even physical constitution (for a review see, for example, Nias 1981, or Martin this volume).

Obviously, the three modes depend on each other. For example, the nature of the type factors will depend on the stimuli considered, and a lack of comprehensiveness on the stimulus side will hinder an appropriate clustering of individuals. Representativeness in all the modes is required and at best they are analyzed simultaneously utilizing a three-mode (or multi-mode) factor analysis.

Even when the recipients typically are asked how funny they find the joke *at the moment* and not in general, the response is quite trait-like. Factor analytic studies show that there is only about 5% state variance in the funniness scores (Ruch 1992). Also, manipulation of internal state (e.g., Ruch 1994c) or external conditions (Derks et al. this volume) do not yield strong effects and retest correlations are sufficiently high (Ruch 1992).

Limitations of the approach. As already noted, the approach focuses on the core of "what is funny to whom?" leaving out the contextual factors. It is attempted to describe the essence of habitual individual differences in humor appreciation, not humor appreciation behavior in everyday life under varying circumstances. Hence, for a prediction of whether a given person will laugh at a given joke told in a specific setting by a particular person, supplemental factors may be needed (for an elaborate discussion of shortcomings and proposed alternatives, see Lampert & Ervin-Tripp this volume). Another limitation relates to the fact that humor appreciation both at

the level of observed behavior and the trait level only represents one *segment* of the domain of humorous conduct. By nature this approach is restricted to the enjoyment of types of humor and it makes no statements about, for example, how witty a person is or how much one would use humor to ease tension in everyday life. While these behaviors might be predicted by a test of humor appreciation, they are not part of the trait definition. In older studies cartoon tests misleadingly were labeled tests of "sense of humor" (just like the more recent unidimensional scales) providing the basis for the misunderstanding that the test is representing sense of humor *per se* (in its totality) rather than some facets only. Tests of humor appreciation will be useful for predicting some classes of behavior but not others.

However, other limitations are less important. For example, a humor test should not be judged by the mean funniness of the items since it is not the prime aim of the test to entertain subjects. Being a test of personality, the variance in funniness scores is much more important than a high mean (not to speak of its prototypicality for the given humor category). The claim for comprehensiveness of a taxonomy implies that "poor" humor, "bad taste" etc. should be included as well; this by nature will further lower mean funniness level. A quick look into a few published studies of humor appreciation confirms the effect that the empirical mean is below the scale midpoint.† In other words, jokes typically are not funny for most people while being extremely funny to a few. Obviously, a humor scale needs a sufficient number of items per category so that aggregation of data will normalize the distribution and make the total scores more reliable.

A two-mode model of humor appreciation

The two-mode model of humor appreciation combines three basic factors of humor stimuli with two basic components of responses to humor. More specifically, an

† It might be instructive to present the empirical distribution of funniness ratings across both subjects and stimuli (in the normative sample for the humor test discussed below) which is quite peculiar. About one third of the responses indicate that the joke is *not funny at all* (= 0) and in only about 5% of the cases the joke is found *very funny* (i.e., the maximal score of 6 is given). Scores 1 through 4 typically oscillate between 15 and 10 percent and a "5" is given by 8% of the responses. Typically, every possible score emerges for every joke; i.e., there is always somebody who does not like the particular joke and always somebody who finds it absolutely hilarious. The item means range from about .5 to 4 with an average of 2.2 points. Interestingly, the same effect and roughly the same mean was found for American cartoons presented to American students (Ruch & Zuckerman 1995). Ironically, one of the many reasons for testing the new items was that the items were not found funny by one of the investigators.

individual's humor profile is described by the degree of *funniness* and *aversiveness* of the humor categories of *incongruity-resolution* humor, *nonsense* humor, and *sexual* humor. Both the humor stimulus and responses factors are the result of a set of factor analyses of humor stimuli (different sets of jokes and cartoons) and response scales using various German and Austrian samples differing with regard to sex, age, occupation, health status and other variables (see Ruch 1992).

Taxonomy of jokes and cartoons

Humor theorists have long acknowledged that, in humor, content and structure (or: joke work vs. tendency [Freud 1905]; thematic vs. schematic [Sears 1934]; cognitive vs. orectic factors [Eysenck 1942]) have to be distinguished as two different sources of pleasure. While intuitive and rational taxonomies typically distinguish between content classes only, factor analytic studies show that structural properties of jokes and cartoons are at least as important as their content, with two factors consistently appearing: namely, incongruity-resolution (INC-RES) humor and nonsense (NON) humor.

Jokes and cartoons of the INC-RES humor category are characterized by punch lines in which the surprising incongruity can be completely resolved. The common element in this type of humor is that the recipient first discovers an incongruity which is then fully resolvable upon consideration of information available elsewhere in the joke or cartoon. Although individuals might differ with respect to how they perceive and/or resolve the incongruity, they have the sense of having "gotten the point" or understood the joke once resolution information has been identified. There is general agreement about the existence of this two-stage structure in the process of perceiving and understanding humor (McGhee et al. 1990).

The other consistently emerging structural factor is nonsense humor, which also has a surprising or incongruous punch line, exactly like incongruity-resolution humor. However, "... the punch line may 1) provide no resolution at all, 2) provide a partial resolution (leaving an essential part of the incongruity unresolved), or 3) actually create new absurdities or incongruities" (McGhee et al. 1990: 124). In nonsense humor the resolution information gives the appearance of making sense out of incongruities without actually doing so. However, the notion of unresolved incongruity in nonsense should not been mistaken as "not comprehensible". People who successfully process nonsense humor know that they have "gotten" what there is to get. They enjoy the play with absurd ideas, the contrast of sense and nonsense; it is not that they enjoy something which they did not understand. Furthermore, nonsense humor should not be confused with the so-called "innocent" humor, because it refers to the typical structure of humor rather than to a harmless content.

Both the incongruity-resolution and the nonsense structure can be the basis for harmless as well as tendentious content (e.g., sexual humor).

The third factor, sexual (SEX) humor, may have either structure, but is homogeneous with respect to sexual content. All jokes and cartoons with a sexual theme (and exclusively those) load on this factor. While the sexual humor category was initially the easiest to identify, it had to be considered that sex jokes and cartoons typically have two loadings: one on the sexual humor factor and a second on one of the two structure factors. The size of this second loading seems to depend on the degree of the theme's salience. In very explicit items (mostly cartoons) the loading on the structure factor is very low, whereas in less salient items the loadings on the content and structure factor can be of about equal size. Thus, one has to distinguish between a factor of sexual humor, which is composed of the content variance of the sexual jokes and cartoons only (bereft of the structure variance), and the sexual humor category (as used in humor tests), in which both content and structure are involved. Whereas a sexual humor factor usually is orthogonal to the two structure factors, the sexual humor category correlates with nonsense and incongruity-resolution humor due to the structure overlap.

These three humor factors consistently explain approximately 40% of the total variance. They are considered to provide an exhaustive taxonomy of jokes and cartoons at a very *general* level (for the validity of other putative categories, such as aggressive humor, see the last section of this chapter).

Dimensions of appreciation

The response mode in humor appreciation is defined by two nearly orthogonal components of positive and negative responses best represented by ratings of "funniness" and "aversiveness" (in former studies called "rejection"). Maximal appreciation of jokes and cartoons consists of high funniness and low aversiveness; while minimal appreciation occurs if the joke is not considered funny but is found aversive. However, a joke can also be considered not funny but be far from being aversive; or it can make one laugh although there are certain annoying aspects (e.g., one can consider the punch line original or clever but dislike the content of the joke).

Subsequent work, however, suggested that the component of positive responses might actually be a broad dimension transcending by far what has been called the "humor response" (i.e., the perception that a stimulus is funny). Factor analytic studies (Ruch & Rath 1993) of responses to humor yield a strong factor of positive evaluation fusing the perception of the stimulus properties (e.g., funny, witty, original) and the induced feeling state (being amused or exhilarated). Furthermore, studies of facial responses (e.g., Ruch 1995c) show that rated funniness or experienced

exhilaration/amusement correlates very highly with smiling and laughter. It has therefore been suggested that we explicitly conceptualize the response to humor as an emotion covering the experiential level, behavior, and physiology (Ruch 1993a). The experiential level, however, is not restricted to perceiving the joke as funny, but includes the awareness of temporary changes in feeling states, the feedback from bodily reactions, and the awareness of actions and action tendencies.

More emphasis should be placed in identifying the list of negative emotions induced by humor as reflected in communicated feeling states and observable behavior. Factor analysis suggests that negative ratings might be further split into two separate but correlated clusters, representing milder, and more cognitive (e.g., plain, feel bored) and stronger affective (e.g., tasteless, feel angered) forms of aversive reactions. While analysis of facial expression already confirmed humor-induced facial displays of discrete emotions (disgust and contempt), the present taxonomy contains only one dimension reflecting the intensity of negative feelings evoked (irrespective of the quality of that feeling).

A test for the assessment of humor appreciation

The 3 WD ("3 *Witz-Dimensionen*") humor test (Ruch 1983) was designed to assess funniness and aversiveness of jokes and cartoons of the three humor categories of incongruity-resolution humor, nonsense humor, and sexual humor. There are three versions of the test (3 WD-K, 3 WD-A, and 3 WD-B) with 50 (Form K) or 35 (Forms A and B) jokes and cartoons which are rated on "funniness" and "aversiveness" using two 7-point scales. The funniness rating ranges from not at all funny = 0 to very funny = 6 and the aversiveness scale ranges from not at all aversive = 0 to very aversive = –6. Forms A and B are parallel tests. They are used together as a long form (with 60 items scored) when reliable measurement is needed or as parallel versions before and after an intervention whose effects have to be evaluated. Forms A and B do not overlap, but their purest items form the 3 WD-K, which is a short form. The first five items of each form are used for warm up and are not scored. The jokes and cartoons are presented in a test booklet with two or three items per page. The instructions are typed on an answer sheet which also contains the two sets of rating scales (for reliability and validity of the 3 WD, see Ruch 1992).

Scores and indices in the 3 WD. Six regular scores can be derived from each form of the test: three for funniness of incongruity-resolution, nonsense and sexual humor (i.e., INC-RES$_f$, NON$_f$, and SEX$_f$) and three for their aversiveness (i.e., INC-RES$_a$, NON$_a$, and SEX$_a$). However, further theory-based indices have been de-

rived and validated. Scores of total funniness and total aversiveness (computed by adding the ratings of the three categories) may serve as indicators of the subject's overall positive and negative responses to humor, respectively. A structure preference index (SPI_f; obtained by subtracting $INC\text{-}RES_f$ from NON_f) was proposed to allow the assessment of the individual's relative preference for resolution in humor over unresolvable or residual incongruities and *vice versa*. Indeed, sometimes INC-RES and NON are hypothesized to relate with the same criterion in *opposite* ways, however, using the separate scales reduced the power of the test since they are *positively* intercorrelated themselves. Likewise, when hypotheses relate to the *content* of sexual humor, indices of appreciation of sexual content (see Forabosco & Ruch 1994) are used to increase the power of the test (rather than SEX_f or SEX_a which also contain structure variance). Hypotheses also may relate differently to the three subcategories of the general sexual humor category and hence subscales of "pure" sexual humor (PURE SEX), incongruity-resolution based sexual humor (INC-RES SEX) and nonsense based sexual humor (NON SEX) may be used. Finally, the funniness and aversiveness scores of a humor type could be combined (or at least treated together conceptually) to form a more general appreciation score.

Validity of the taxonomy

Do the factors make sense in other cultures or is their validity restricted to the German speaking countries? Cross-cultural research on developing a humor taxonomy should be considered to be a foremost goal of humor research. Such a taxonomy might serve as a common frame of reference for integrating research findings stemming from different laboratories in, ideally, different countries.

In order to estimate the degree to which the present taxonomy may be culture specific or universal, several studies were carried out in which translated versions of the 3 WD were administered to a sample of adults of the respective country. The factor structure of the jokes and cartoons was derived and compared with the German target matrix. Typically, the factor structures were very similar both at the level of the factors (see Table 1) themselves and at the level of individual jokes and cartoons.

Thus, people in different countries were equally sensitive to distinctions between different degrees of resolution and other structural features — and appreciation of sexual content formed a separate category. Furthermore, typically comparable rank orders of perceived quality and controversiality (mean and variance of funniness ratings, respectively) of jokes and cartoons were obtained. Since the samples collected were not representative for the countries studied, the results do not allow for a *cross-national comparison* of humor; however, they provide a basis for deriving hypotheses for future more *genuine* studies on national differences in humor appreciation.

Table 1. Cross-national stability of the humor taxonomy

	Germany I compared with	INC-RES C	INC-RES T	NON C	NON T	SEX C	SEX T
Ruch & Hehl (1984)	Germany II	1.00	.97	1.00	.94	1.00	.94
Ruch & Hehl (1984)	Austria I	.99	.87	.98	.87	.97	.77
Ruch & Hehl (1984)	Austria II	.99	.86	.97	.79	.97	.90
Ruch et al. (1991)	France	.98	.88	.98	.91	.99	.93
Köhler et al. (1995)	England	1.00	.88	.99	.77	.99	.92
Rapoport (1995)	Israel	.95	.89	.95	.81	.96	.90
Ruch & Forabosco (1996)	Italy	.93	.84	.96	.84	.95	.94

Notes. C = Cosine between corresponding factors (Kaiser et al. 1971). Cosines between .98 and 1.00 indicate *essentially identical* factor structure (.95 to .98: *similar* factor structure; .90 to .95: *fairly similar*; .80 is considered to be the lower bound of acceptable similarity). T = Tucker's Phi (congruence coefficient).

Temporal and cultural limitations to the comprehensiveness of the taxonomy. While it can be claimed that the intrinsic structure in the 3 WD humor pool is stable across the (mainly European) countries studied so far, these results do not imply that there may be no additional humor categories in the countries studied or in other countries. Joint factor analyses of the 3 WD item pool *and* humor material selected to represent potential new categories should be carried out to answer this question.

Furthermore, even a very carefully constructed taxonomy can only claim temporal comprehensiveness. This is due to the fact that there is no constant population of jokes; the universe of humor items (from which only samples are studied) is increasing steadily and daily. Also, forms of humor get outdated, making categories obsolete. Furthermore, while the number of cartoons or jokes in daily newspapers theoretically could be counted; there is no way to access the number of new jokes that circulate orally, making achievement of a comprehensive taxonomy challenging. However, given that at a general level such diverse jokes and cartoons fall into only three clusters, the chance that the emergence of new cartoonists or joke waves will change the entire system is rather limited. Likewise, given that so far only sex emerged as a prominent topic, it is unlikely that entirely new content categories will emerge unless one also considers topical humor. In an attempt to test the comprehensiveness of the taxonomy, Köhler and Ruch (1994) studied Gary Larson's *Far Side Gallery*, a cartoon series that became very popular in the past years and was also used in humor studies. Eighty German adults rated funniness and aversiveness of eight selected *Far Side* cartoons and the 50 jokes and cartoons of the 3 WD-K on two seven-point scales. As expected, the eight *Far Side* cartoons correlated significantly positively (coefficients for funniness ranged from .45 to .67; all $p < .0001$)

with the nonsense humor category. Total funniness of the *Far Side* cartoons and NON_f correlated to the extent of .77; this coefficient is equivalent to the parallel test-reliability (Forms A and B) of the 3 WD (Ruch 1992). The correlations with the INC-RES (.33) and SEX (.38) humor categories were much lower. Also, NON_a and aversiveness of *Far Side* cartoons correlated strongly positively ($r = .69$). Thus, while the (studied) *Far Side* cartoons do enrich the pool of nonsense cartoons, they do not challenge the comprehensiveness of the 3 WD taxonomy.

Can the taxonomy be replicated? The complete taxonomy has not been replicated by independent research. However, it is obvious that a successful replication is contingent on a broad (not to speak of representative) sampling of jokes or cartoons. The factor analyses conducted recently had different goals and were restricted to more homogeneous pools of jokes or cartoons. However, there is support for the individual factors of the taxonomy. A factor of sexual humor was detected in all factor analytic studies from the beginning of this type of inquiry (Eysenck 1942) to the most recent ones (e.g., Herzog & Larwin 1988; Kosuch & Köhler 1989; Lowis & Nieuwoudt 1995). There is direct evidence for *structural* factors coming from the early study by Eysenck (1942) who extracted a component of *simple vs. complex* jokes. Indirect evidence comes from studies reporting of factors dealing with themes too diverse to give a content-related label (Herzog & Larwin 1988) or calling them "harmless" (Kosuch & Köhler 1989), and from studies which yielded g-factor type solutions although a variety of themes were presented. As regards the latter, Khoury (1978) studied five types of jokes and found substantial correspondence between the enjoyment of types of jokes considered to be disparate. Similarly, Lowis and Nieuwoudt (1995) sampled cartoons from one magazine and found one very strong general factor. Inspection of the item pools of different studies suggests that primarily incongruity-resolution humor items were considered. A replication of the present taxonomy is only possible if a sufficiently high number of nonsense humor items – at best markers from the 3 WD item pool – is present as well. Alternatively, if one considers an entirely independent development of a taxonomy, precautions should be taken that an appropriate definition of the item universe is undertaken and that rules are generated that allow a representative sampling of the universe. Obviously, the study of only one joke book or only cartoons from the New Yorker is prone to produce biased results.

Are the factors specific for the domain of humor appreciation or more global? The taxonomy was developed using jokes and cartoons (and initially also limericks) and hence the derived factors might be specific for these domains. However, since the verbal and graphical material merges in the factors, there is grounds to assume that their validity goes beyond the realm of jokes and cartoons. No joint factor analytic study of the 3 WD and another domain of humor has been conducted; however, the

3 WD was correlated with humor variables from other domains. In masters theses conducted in our laboratory video tapes were selected *a priori* to present the different factors; this assignment was later examined by correlating verbal or facial responses with the 3 WD. Such studies confirmed, for example, that appreciation of nonsense correlated with finding (selected scenes from) Monty Python's *Meaning of Life* funny (Frost 1992). Similarly, the humor induced by a weight-judgment task correlated with the 3 WD (Köhler 1993). Lifting incongruous weights seems to be primarily amusing to those finding residual incongruity disturbing and resolvable incongruity enjoyable; no correlation with funniness of nonsense emerged.

Correlations also emerged with self-report data. The correlations between trait seriousness and the 3 WD are presented by Ruch and Köhler (this volume). Ruch and Hehl (1985) studied the relation between the 3 WD and a self-report scale of humor. One of the scales, *conventional vs. unconventional humor*, correlated highly positively with NON_f and negatively with $INC\text{-}RES_f$. Analysis of the content of individual items correlating significantly showed, for example, that high scores in $INC\text{-}RES_f$ correlated with not knowing particular satirical magazines and disliking too complicated jokes, while high scores in NON_f correlated with knowing particular comedians (of a nonsense type) and not finding animated cartoons childish. Additionally, finding nonsense aversive correlated negatively with liking satire.

In a yet unpublished study ($N = 106$) the 3 WD was correlated with a self-report instrument of comic styles based on the typology by Schmidt-Hidding (1963). While people scoring high in NON_f described themselves as practicing nonsense as well as irony, satire, and sarcasm, high scorers in $INC\text{-}RES_f$ indicated that their comic style characteristically included benevolent humor and fun as well. The same subjects also rated the degree to which 97 type nouns related to humor and humorlessness (for example, 'cynic', 'humorist', 'jester') applied to them, and a good acquaintance filled in a peer-evaluation form. In the self-evaluation data, the attribute nouns correlating positively with funniness of nonsense were 'grouser', 'a person messing around' (*Quatschkopf*), and 'big kid', while 'cheerful person' correlated negatively. Individuals who found INC-RES humor funny were more likely to call themselves 'jolly' and 'smiling' types, and less likely so to be 'grumps' or 'class-clowns'. The structure preference index was most predictive with 'cheerful person' and 'happy soul' marking the INC-RES>NON pole and 'grump', 'grouser', 'cynic', and 'class-clown' marking the NON>INC-RES end of the continuum. The peer data gave a similar picture with even more significant correlations. Positive correlations with SPI_f related to 'satirist', 'cynic', and 'ironic person', but also 'comic', 'class-clown', 'big kid', 'scalawag', 'rogue/wag', 'crosspatch, 'grouch', and 'real character'.

There is also some indication of a relationship between humor appreciation and production. Köhler and Ruch (1995) found appreciation of nonsense (but not of incongruity-resolution) to be slightly positively correlated with humor production;

people who had more wit found nonsense funnier than those who were poor in writing punch lines to caption removed cartoons.

Responses to humor categories. Derks and collaborators conducted a set of "priming" experiments with the basic assumption that the perceived funniness of a joke or a cartoon will differ as a function of what kind of humor was presented before in the sequence. In two experiments they primed humor structure (INC-RES vs. NON) by prior exposure to humor of the same or different structure (Staley & Derks 1995). They found in both experiments that NON and INC-RES were perceived as distinct humor structures, and this distinction led to higher funniness and higher aversiveness ratings for INC-RES than for NON. Funniness ratings increased with priming exposure, however, and aversiveness ratings remained constant or decreased.

In a rating study, Ruch and Rath (1993) found that subjects perceived the three humor categories to be different in a variety of issues although they did not differ in 'funniness' or 'felt amusement'. Sexual humor (as compared to the structure-dominated types) was rated higher on 'tasteless', 'embarrassing', 'aggressive', 'simple', and felt 'indignation', and lower on 'subtle' and 'childish'. Nonsense was rated higher on 'original' than sexual humor. Both incongruity-resolution and sexual humor were considered to be more aggressive than nonsense and incongruity-resolution humor was higher on 'tasteless' than nonsense. Finally, both nonsense and sexual humor were considered to induce more puzzlement than incongruity-resolution humor.

Humor structure and stimulus uncertainty

Historically, in both philosophy and psychology the study of humor started in the area of aesthetics. The general term was *the comic* (subsuming phenomena like wit, humor, irony, satire, etc.), which, like tragedy, beauty, or harmony was one category of aesthetics. There is indeed a structural similarity in the questions of what features make something be perceived as beautiful and what makes something appear comical or funny. While in the second half of this century research on humor appreciation developed independently of the study of art, some researchers remained in that tradition, with Berlyne (1972) providing the strongest advocacy for the affinity of humor and art. Indeed, the structural features of humor have much in common with the so called "collative" variables (e.g., novelty, surprisingness, complexity, ambiguity, or incompatibility) and can be discussed in that context. Berlyne also pointed out that the "collative" variables have much in common with the information theorist's concept of "uncertainty", "information value", and "redundancy".

Research on individual differences in humor appreciation has tended to neglect this affinity with art. While some researchers (e.g., Eysenck 1953) presented the

study of humor appreciation in the context of research on general aesthetic preferences, surprisingly no *direct* study on the relationship between humor appreciation and appreciation of art was undertaken. For example, one obvious hypothesis would state that liking of complex art should correlate with funniness of complex forms of humor (since degree of complexity is considered to determine both the perception of what is beautiful, or aesthetically pleasing and of what is funny). Curiously though, the variables sought to predict humor appreciation primarily stemmed from the domains of temperament (e.g., extraversion, anxiety) or intelligence. Still more curious (and an irony of history of research on humor), the same book that put forward a powerful theory of conservatism linking this trait with the information theory concept of stimulus and response uncertainty (Wilson 1973) still discussed the relationship between humor and conservatism within the framework of the Freudian theory of jokes, after applying the theory to explain the links with art.

There is indirect evidence of a relationship between preferences of humor and aesthetics. The strongest predictors of enjoyment of both humor structures bear a theoretical link to collative variables and have been proven to predict aesthetic preferences. According to Wilson's (1973) dynamic theory of conservatism this trait reflects a *generalized fear of both stimulus and response uncertainty*. This should lead more conservative individuals to show greater avoidance and dislike of novel, complex, unfamiliar, incongruous events and to prefer and seek out stimuli which are simpler, more familiar and congruent. This hypothesis was validated for visual art, poetry, and music. Not surprisingly, then, the hypotheses that conservative persons find incongruity-resolution humor more funny and nonsense humor more aversive than liberals could be substantiated. While conservatism does not predict the *seeking* of stimulus uncertainty, the trait of sensation seeking (Zuckerman 1994), and in particular the component of experience seeking (ES), does. ES involves the seeking of stimulation through the mind and the senses, through art, travel, even psychedelic drugs, music, and the wish to live in an unconventional style. There is evidence that ES is closely related to the novelty and complexity dimensions of stimuli. Therefore it was hypothesized and substantiated that ES will be positively related to appreciation of nonsense humor (for details see Ruch 1992).

A more direct test of the hypothesis, however, should try to have as little content and method overlap as possible. Ideally, the subjects should be confronted with (on the surface) very different material which, however, has identical structural features that involve the individual in the same processes (e.g., enjoying to detect and resolve an incongruity; enjoying the confrontation with residual incongruity) that humor does. While it might be desirable to achieve a perfect match of type of collative variable in humor and art, it is evident that this can hardly be achieved for a great number of tasks. Therefore, the second best test would be to confront subjects with very different material of *related* structural features; that is, with tasks that in-

corporate collative variables of a *similar* class that are located on the same pole of the more global dimension of stimulus uncertainty vs. redundancy. The reasoning here is that somebody who prefers complexity over simplicity will also tend to prefer asymmetry over symmetry, and ambiguous over unambiguous stimuli. Therefore, the general hypotheses were put forward stating that appreciation of the incongruity-resolution structure is a manifestation of a broader need of individuals for contact with structured, stable, unambiguous, and simple forms of stimulation, whereas appreciation of the nonsense structure in humor reflects a generalized need for uncertain, unpredictable, ambiguous and complex stimuli (see Ruch 1992). Obviously, the confirmation of these hypotheses in studies of art objects (with no content overlap) would also provide strong support for the claim that variance in humor appreciation is due to differential appreciation of structural properties and that humor taxonomies need to consider the structural axis as well.

A study of appreciation of humor structure and aesthetics

In order to examine the hypothesis that individuals' responses to humor reflect appreciation of *structural properties,* two sorts of studies will be undertaken. First, humor appreciation will be correlated with personality measures relating to aesthetic sensitivity. One candidate tested in the present study is Openness to experience, the disputed (see, for example, DeRaad & Van Heck 1994; Eysenck 1991) fifth factor of the five-factor model of personality. Openness to experience contains the facets of openness (vs. closedness) in the areas of ideas, fantasies, actions, feelings, aesthetics, and values. Recently, McCrae (1996) argued that Openness is associated with the need for novelty, variety, and complexity, and closedness to experience is manifested in a preference for familiarity, simplicity and closure. Hence one might expect Openness to correlate positively with nonsense and negatively with incongruity-resolution humor. The other variable is the Mental Experience Seeking component of a facet model of sensation seeking (Andresen 1990) that is somewhat different from that by Zuckerman (1994). The main reason for inclusion of the scale is to test whether the comparably high number of items yields higher coefficients than previously found for the original experience seeking scale.

Second, a more direct verification of the nature of the structure elements in humor will be undertaken by investigating preference for stimulus properties like symmetry/asymmetry or complexity/simplicity in objects different from humor. One standardized instrument, the Barron Welsh Art Scale (BWAS; Barron & Welsh 1952) measuring artistic perception as a personality style will be used. This figure-preference-test is well validated (for a review, see Gough et al. 1996) and was suggested for the assessment of complexity-simplicity as a personality dimension (Barron

1953). Furthermore, self designed experimental tasks will be employed that involve more or less stimulus uncertainty. These perceptual and performance tasks cover judging art differing in complexity-simplicity and representational vs. abstract/fantastic, judging polygons of different complexity, making preference selection of polygons based on symmetry, producing aesthetically pleasing and displeasing black/white patterns on a square card containing 10 rows and 10 columns, and subjects' exploratory behavior when wearing "prism glasses".

The manual to the BWAS (Welsh 1959) reports that high scores correlate with sense of humor (measure not specified). However, again, it is expected that the positive correlation will occur for funniness of nonsense only, while INC-RES_f is expected to correlate negatively with the art scale (and positively only with the subscale of simple drawings). More generally, the global hypothesis to be tested states that the enjoyment of different forms of humor reflects broader dispositions to seek out and enjoy events which offer more or less stimulus uncertainty, with enjoyment of incongruity-resolution and of nonsense humor correlating with the uncertainty avoiding and uncertainty seeking poles, respectively.

Method: Study I

Research participants. Subjects were 68 male non-psychology students that were recruited by advertisements on campus and were paid for their participation. Their ages ranged between 20 and 31 years, with a mean of 24.4 (*SD* = 3.0) years.

Material. Subjects answered form K of the *3 WD humor test* (Ruch 1983). Furthermore, they were presented several aesthetic judgment and performance tasks.

(a) *Artistic postcards.* Fifty artistic postcards covering a broad range of art styles of this century were rated on a seven-point scale of *pleasantness* (–3 = extremely displeasing, +3 = very pleasing). They were preclassified by a group of eight art students into the four groups of *simple-representational* (11 cases), *simple-abstract* (or *fantastic)* (5), *complex-representational* (21) and *complex-abstract* (13) paintings. On average they agreed in 86.25% of the pictures. There was a perfect agreement in 26 (out of 50) cases and a minimal agreement of 62.5% (5 out of 8 raters). In addition to total score for the four categories, composite scores (weighted for number) for *simple*, *complex*, *representational*, and *abstract* paintings were derived.

(b) *Polygons Set A.* Thirty-six polygons representing 12 different levels of *complexity* (adapted from a study by Munsinger & Kessen 1964) rated for *pleasantness* (–3 = extremely displeasing, +3 = very pleasing). There were 3 polygons each with an equal number of sides but of a different shape. Polygons were grouped into four *complexity levels* (level I: 3, 4, and 5 sides; II: 6, 8, and 10; III: 13, 16, and 20; IV: 25, 31, and 40) and a total score of liking of polygons was derived as well.

(c) *Polygons Set B.* Twelve pairs of polygons ranging from 6 to 42 sides (adapted from Munsinger & Kessen 1964). Each member of a pair had the same number of sides, but the sides were arranged symmetrically in one case and asymmetrically in the other. Both alternatives were presented simultaneously with the position of the symmetric/asymmetric being altered. Subjects indicated which member of the pair they preferred. Scores were derived for number of asymmetric choices for *low* (6, 7, 10, and 12 sides), *medium* (14, 16, 18, and 22), and *high* (26, 30, 36, and 42) complex polygons as well as the *total* number.

(d) *Matrix-pattern.* Subjects were required to arrange 100 square plastic tiles (white, and black on the reverse side) as a black/white configuration on a board composed of green squares in a 10 x 10 dimensional array. They were requested to produce both one aesthetically *pleasing* and one *displeasing* matrix-pattern. All 100 tiles had to be used. Eight experts rated all patterns for degree of complexity (1 = simple to 5 = complex), and two total complexity scores for the *pleasing* (Cronbach $\alpha = .98$) and *displeasing* ($\alpha = .99$) patterns were compiled by summating the scores of the judges. While pleasing ($M = 25.65$; $SD = 9.51$) and displeasing ($M = 24.04$; $SD = 11.21$) patterns did not differ in average complexity, they tended to be negatively correlated ($r = -.20$; $p = .09$; $df = 68$). A *complexity preference index* was computed by subtracting rated complexity of displeasing from complexity of pleasing patterns (i.e., a positive score indicates preference of complexity).

(e) *Sensorial incongruity.* A final task involved the use of "prism-glasses" which distorted the normal visual field by either inverting everything or reversing the right-left relationship. Under the guise of offering a "warm-up" period to allow participants to adapt to the glasses before the commencement of the experiment, they were permitted as much time as they needed and were allowed to do whatever they wanted to with the glasses. The experimenter left the room and from an adjacent room two raters coded each behavioral act aimed at increasing (or decreasing) the sensory incongruity (e.g., movement of the head, hand movements in front of the head, standing, or walking, as opposed to sitting). The *total number of movements* and the *total time* the participants kept the glasses on were considered for data analysis. These two were positively correlated ($r = .68$; $p < .001$).

Procedure. Participants were tested individually by two experimenters. The testing session lasted approximately 150 minutes.

Method: Study II

Participants. Subjects were 112 German adults (62 female; 50 male) who were paid for their participation. Their age was between 18 and 59 years ($M = 28.86$; $SD = 9.88$ years) and they were heterogeneous with regard to profession, education, and social status.

Material. The participants answered the following tests and inventories:

(a) The *NEO-PI* (Costa & McCrae 1985). A questionnaire containing 180 items, which are rated on a five-point scale. The inventory examines the dimensions of Neuroticism (N), Extraversion (E), Openness (O), Agreeableness (A), and Conscientiousness (C). E, N, and O are represented by six scales measuring facets of the domain factor. The subjects answered a German translation of the NEO-PI.

(b) *MISAP-III SO* (Andresen 1990). A questionnaire with 192 items in a 4-point format measuring eight components of sensation seeking *sensu* Andresen (1990): Competition and Achievement Seeking, Thrill and Adventure Seeking, Luxury Amusement Seeking, Mental Experience Seeking, Prosocial Engagement Seeking, Sociability Expression Seeking, Disinhibition, and Boredom Susceptibility.

(c) *The 3 WD humor test - Forms A and B* (Ruch 1983). In the present sample, correlations between corresponding scales of both forms were high ($INC\text{-}RES_f$: .72, NON_f: .70, SEX_f: .72, $INC\text{-}RES_a$: .76, NON_a: .76, and SEX_a: .83; SPI_f: .64) as were the Cronbach alphas for the combined forms (.91, .88, .91, .91, .88, and .95, respectively). In order to assure a high reliability, items of both forms were subjected to a joint factor analysis and factor scores for oblique factors were compiled.

Procedure. The tests were brought in a fixed order and combined to form a booklet. Participants were instructed to complete the tests at home, alone, without any hurry and to return them in a few days. The reported testing time varied from 90 to about 120 minutes.

Method: Study III

Participants. Subjects were 106 German adults (64 female; 42 male) who were paid for their participation. Their age was between 18 and 67 years (M = 26.75; SD = 9.11 years).

Material. Among others the following tests and inventories were administered:

(a) *Big Five Questionnaire (BFQ*; Caprara et al. 1993). A questionnaire containing 132 statements which have to be rated on a five-point scale. The inventory examines the personality dimensions of Energy/Extraversion (E; facets: Dynamism, Dominance), Friendliness (F: Cooperativeness, Politeness); Conscientiousness (C: Scrupulousness, Perseverance), Emotional Stability (S: Emotion control, Impulse control), and Openness (O: Openness to culture, Openness to experiences).

(b) *Barron-Welsh Art Scale* (Welsh 1959). A collection of 84 line drawings (of approximately 2 by 3 inch) for which subjects indicate whether they "like" or "don't like" them. The total score (composed of 62 items) of *liking of complexity as opposed to simplicity* was used. Furthermore, separate scores for *liking of complexity* and *liking of simplicity* were derived by summing up the relevant 24 "like" and 38 "don't like" items, respectively.

(c) *The 3 WD humor test* (Ruch 1995d). This final form of the 3 WD contains the purest 35 items of Forms A and B. Cronbach alpha coefficients for the six scales were .83, .77, .82, .89, .76, and .89.

Procedure. All participants were tested individually in the lab. The tests were presented in a fixed order.

Results

Personality measures of aesthetic sensitivity. The correlations found for the standard scores of the 3 WD were low but consistent (see Table 2): Funniness of nonsense and the structure preference index correlated positively with the Openness scales of the NEO and the BFQ, as well as with Mental Experience Seeking of the MISAP (the latter being highly positively correlated with NEO-O, $r = .57$; $p < .001$). The consideration of subscales was telling; while the BFQ-facet of Openness to experiences, and NEO-Openness in the domains of values, aesthetics, and ideas were predictive of finding nonsense humor funny, the facets of openness to culture, feelings, and actions were not. Individuals low in NEO-Openness to experience (but not in the BFQ) found nonsense aversive; this was particularly true for openness in the domains of values, ideas, and aesthetics. Funniness of incongruity-resolution humor was negatively correlated with NEO-Openness (total scale, and facets of fantasy and values) but not with BFQ-Openness (not containing items pertaining to attitudes or values) and Mental Experience Seeking.

Thus, while the correlations were generally weak, it appears that appreciation of the structural features in humor is embedded into the individuals' mental openness. Individuals seeking experiences through the mind and the senses prefer nonsense humor, and individuals for which this need is less pertinent prefer incongruity-resolution humor. As in prior studies, disinhibition correlated with appreciation of sexual humor (SEX_f: $r = .22$, $p < .05$; SEX_a: $r = -.26$; $p < .01$), and boredom susceptibility correlated positively with funniness of sexual humor (SEX_f: $r = .22$, $p < .05$). While NEO-Agreeableness correlated with incongruity-resolution humor, in the BFQ only the facet of cooperativeness ($r = .22$, $p < .05$) but not politeness ($r = .06$, ns) yielded a significant correlation.

Aesthetic judgment and performance tasks. Although not significant for every variable, funniness of incongruity-resolution humor and of nonsense humor seem to reflect preferences for simplicity and complexity, respectively (see Table 3). Individuals finding completely resolvable punch lines funny found *simple* (and in particular *simple-representational*) paintings pleasing and they liked the *simple* line drawings of the Barron-Welsh Art Scale more than people low in funniness of incongruity-resolution humor. Funniness of nonsense humor correlated positively with finding *complex-fantastic* pictures pleasing, liking the *complex* line drawings of the

Table 2. Humor appreciation and personality measures of aesthetic sensitivity

Personality scales	INC-RES$_f$	NON$_f$	INC-RES$_a$	NON$_a$	SPI$_f$
NEO—PI domain scales					
Neuroticism	.16	−.03	.00	.01	−.13
Extraversion	−.02	−.01	−.02	−.07	.00
Openness to experience	−.22*	.27**	.00	−.27**	.30**
Agreeableness	.25**	−.04	−.04	−.10	−.20*
Conscientiousness	.17	−.02	−.07	−.08	−.13
Facets of Openness					
O1: Fantasy	−.19*	.18	−.10	−.08	.24*
O2: Aesthetics	−.10	.27**	.04	−.26**	.22*
O3: Feelings	−.02	.04	−.18	−.13	.04
O4: Actions	−.17	.08	.08	−.07	.16
O5: Ideas	−.12	.23*	.04	−.31***	.21*
O6: Values	−.34***	.31***	.11	−.26**	.41***
BFQ-scales					
Energy	.08	−.01	−.11	−.02	−.08
Friendliness	.18	−.04	−.21*	−.07	−.18
Conscientiousness	−.07	−.13	.02	.05	−.04
Emotional stability	.14	−.14	.09	.15	−.23*
Openness	.00	.28**	.13	.14	.21*
Facets of Openness					
Openness to culture	.04	.17	.08	.03	.10
Openness to experiences	−.03	.30**	.14	.20	.26*
MISAP-III SO scales					
Comp. & Achievement Seeking	−.12	.02	−.07	.07	.10
Thrill & Adventure Seeking	−.25**	.05	.01	.03	.20*
Luxury Amusement Seeking	.08	−.25*	−.05	.08	−.19*
Mental Experience Seeking	−.15	.23*	−.10	−.11	.23*
Prosocial Engagement Seeking	.12	.02	−.14	−.21*	−.07
Sociability Expression Seeking	.04	−.05	−.10	.01	−.06
Disinhibition	−.38***	.15	.01	−.01	.35***
Boredom Susceptibility	−.07	−.07	.12	.12	.01

Note. $N = 112$ (NEO-PI), 104 (MISAP-III SO), and 95 (BFQ).
* $p < .05$; ** $p < .01$; *** $p < .001$.

BWAS, and liking the polygons of medium complexity levels. The polygons of very high complexity (25 to 40 sides) perhaps were already "representational"; i.e., they might have been perceived as meaningful "objects" thereby reducing complexity. The correlations with the preference for asymmetric polygons failed to be significant.

As regards the *production* tasks, individuals finding nonsense humor funny produced matrix-patterns that were rated more complex by peers and they experimented

Table 3. Appreciation of humor structure and aesthetic judgment and performance tasks

	$INC\text{-}RES_f$	NON_f	$INC\text{-}RES_a$	NON_a	SPI_f
a) Rating tasks					
Art photographs					
simple-representational	.25*	.06	.12	.13	−.17
simple-abstract	.21†	.15	−.16	−.15	−.05
complex-representational	−.14	.18	−.02	−.18	.31**
complex-abstract	.12	.38**	−.21†	−.37**	.27*
weighted totals					
simple	.26*	.12	−.01	−.01	−.13
complex	.02	.37**	−.17	−.36**	.35**
representational	.10	.18	.09	−.02	.08
abstract/fantastic	.19	.34**	−.22†	−.33**	.16
Polygons of different complexity					
Level I	.08	.14	−.16	−.17	.07
Level II	.08	.24*	−.16	−.19	.17
Level III	.16	.27*	−.14	−.13	.12
Level IV	.14	.16	.03	.02	.03
Liking of polygons-total	.22†	.36**	−.17	−.19	.15
Preference for asymmetric polygons					
low complexity	−.07	.16	.01	−.04	.23†
medium complexity	−.16	.13	.17	.07	.29*
high complexity	−.08	.12	.07	−.08	.20
total asymmetry	−.13	.17	.10	−.02	.29*
Barron-Welsh Art Scale					
Dislike (simple)	.22*	−.07	−.12	−.07	−.24*
Like (complex)	−.11	.20*	−.04	−.06	.25**
Total	−.23*	.16	.08	.02	.31***
b) Production tasks					
Complexity of matrix-patterns					
pleasing	.04	.30*	.09	.02	.26*
displeasing	.02	−.09	.11	.21†	−.11
pleasing – displeasing	.01	.24*	−.02	−.14	.23†
Prism glasses					
Total duration wearing glasses	.09	.29*	.01	−.12	.21†
Number of movements	.16	.30*	−.02	−.12	.14

Note. $N = 68$ (except for BWAS, $N = 106$).
* $p < .05$; ** $p < .01$; *** $p < .001$; † $p < .05$ (one-tailed).

with the prism glasses longer and showed more acts to increase sensorial incongruity than did individuals low in funniness of nonsense humor. Not surprisingly, individuals producing very complex ("chaotic") matrix-patterns under the *displeasing* instruction were the ones finding humor aversive when punch lines are not fully re-

solvable. Furthermore, persons high in aversiveness of nonsense also disliked the *complex-fantastic* art postcards.

The *structure preference index* improved the size of the correlations for predictors that are ipsative measures themselves, such as the BWAS total score (contrasting simple and complex patterns) and preference for *asymmetric* polygons (of medium complexity). Thus, those preferring nonsense over incongruity-resolution also preferred complexity over simplicity, and asymmetry over symmetry. They also indicated preference for complexity over simplicity when *generating* matrix patterns; comparisons of extreme groups in SPI_f showed that the group preferring unresolvable incongruities ($N = 21$) also scored higher in the complexity preference index than the group preferring resolution of incongruity ($N = 20$). A contingency table for extreme groups on both preference indices turned out to be significant as well, $\chi^2(1) = 4.68$ ($p < .05$); of the 10 subjects preferring NON (over INC-RES) only one produced the pleasing pattern less complex than the displeasing one.

Figure 1 shows that the six extreme scorers in SPI_f have almost opposite complexity preferences; the pleasing matrix patterns of the three resolution seekers resemble the displeasing patterns of the high scorers in SPI_f (perhaps perceived by them as being 'boring') and vice versa, their displeasing patterns (perhaps perceived as being 'chaotic') resemble the ones representing the pleasing patterns produced by the three subjects preferring unresolved incongruity.

What is the real strength of the relationship between humor structure and art? The structure preference index already indicates that the elimination of specific variance can increase the size of the coefficients. There is further grounds to assume that the zero-order correlations of Table 3 underestimate the real strength of relationship. A few analyses were undertaken to clarify the factors that lower the relationship. One reason might be that the different indicators of complexity and simplicity are not correlated very well themselves. Indeed, the correlations between liking of simple drawings and of simple polygons did not exceed .10. While the highest coefficient obtained for the different indices of complexity was .36, others were very low. For example, liking of complex paintings and complexity of produced pleasing pattern were uncorrelated ($r = .15$, ns) and both did not correlate with number of movements when wearing prism glasses (–.04 and .16, respectively, ns). Thus, combining these indices of complexity should enhance the quality of prediction. Indeed, the multiple correlation between liking of complex paintings, complexity of produced pattern and number of movements (as predictors) and funniness of nonsense (as criterion) amounted to .52 ($df = 3$ and 63; $p < .001$).

Furthermore, the different correlational structure among predictors and among criteria limited the coefficients. While funniness of INC-RES and NON correlated highly *positively* ($r = .48$, $p < .001$) in study I, liking of simple and complex paint-

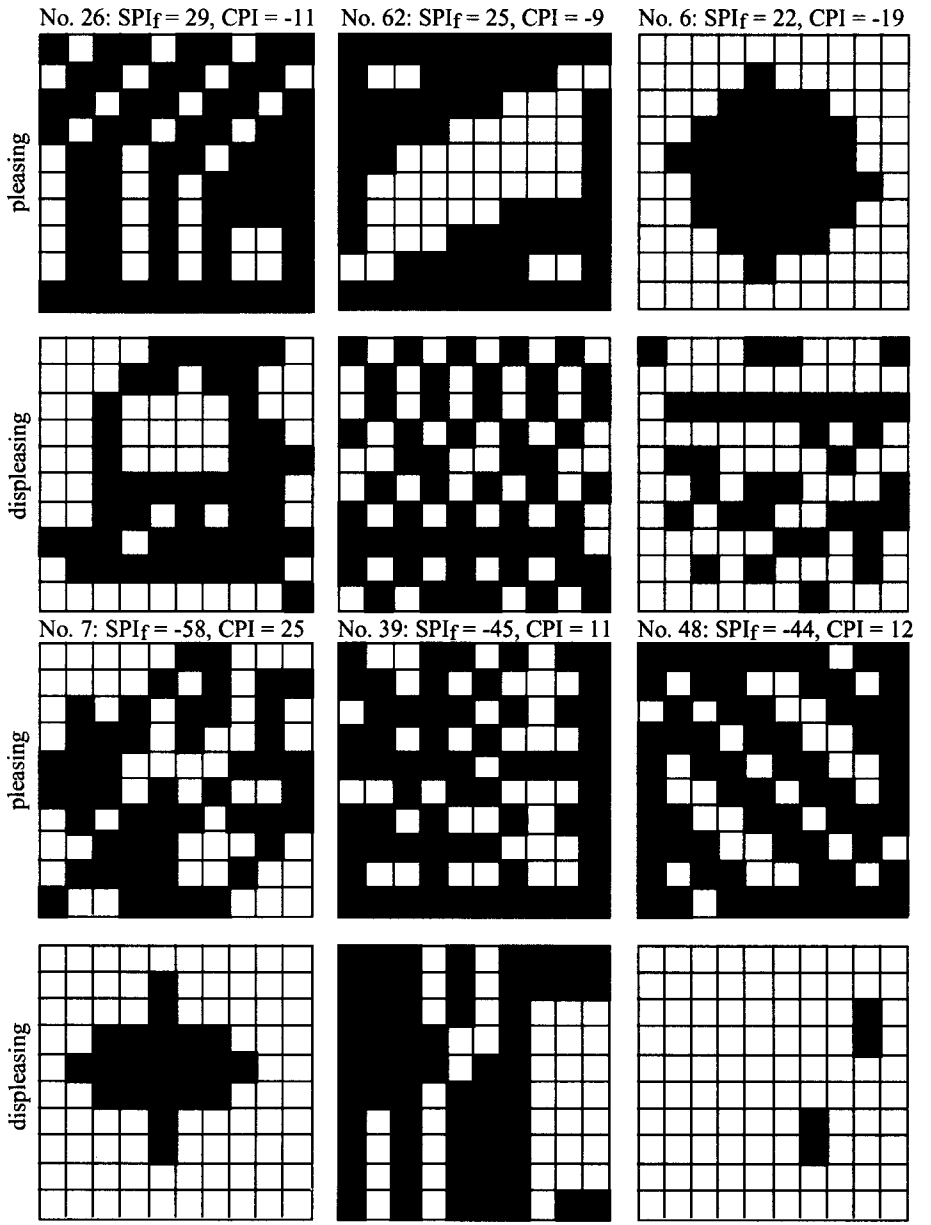

Figure 1. Pleasing and displeasing patterns produced by individuals with a preference for either incongruity-resolution humor (upper half) or nonsense humor (lower half)

ings did so only negligibly ($r = .11$, ns) and complexity of pleasing and displeasing patterns even tended to be *negatively* correlated ($r = -.20$, ns) impairing a match between them. While there was the positive correlation between funniness of nonsense and complexity of produced patterns, the expected negative correlation between INC-RES and complexity of patterns only was negative (–.12; but failed to be significant) once the effects of NON_f were partialled out. Likewise, funniness of INC-RES and NON correlated positively ($r = .25$, $p < .01$) in study III; however, liking of complexity and liking of simplicity (BWAS) were negatively correlated ($r = -.18$, $p = .06$), again lowering the upper limit of the size of correlations.

Finally, the relationship was weakened by the fact that for humor the two elements of appreciation (funniness and aversiveness) were kept separate while the "like" and "dislike" elements in the art ratings were combined in one response dimension. Since for each of the two structure factors there was only a slight negative correlation between funniness and aversiveness (coefficients typically from .05 to –.20), there was not much overlap in their separate correlations with a predictor, and one can expect that the strength of the relationship will increase if one combines the predictive power of both elements of humor appreciation. Indeed, for example, the correlation between appreciation of nonsense and pleasantness of *complex-abstract* paintings increased to .48 ($df = 2$ and 65; $p < .001$) when a multiple correlation with funniness and aversiveness as predictors was computed.

Analysis of individual items. The relationship between complexity-simplicity and appreciation of humor structure is further illuminated by analyzing the judgments of individual paintings and the items of the BWAS. Table 4 gives the pictures with a significant ($p < .05$; no alpha-adjustment) zero-order correlation with appreciation of humor structure (along with the size of the coefficient, the painter and the category in which the painting was placed by the art students).

Table 4 shows that appreciation of the two humor structures coincides with the complexity-simplicity distinction. Counting the sheer number of significant coefficients confirms that the structure preference index was most strongly correlated with liking of art, followed by appreciation (both funniness *and* aversiveness) of nonsense. Appreciation of incongruity-resolution yielded few correlations; still, liking of certain paintings went along with absolute and relative (compared to nonsense) funniness of resolvable types of humor.

Next the correlation between individual BWAS-items and the 3 WD scales were inspected. Taking the .19 ($p < .05$) as a cut-point, 11 drawings were positively correlated (coefficients ranged from .19 to .31; item numbers [in increasing order of coefficient size]: 10; 76; 27; 45; 75; 47; 38; 41; 34; 48; 81) with $INC\text{-}RES_f$. They depict simple figures like triangles, circles, cylinders, or a cross. NON_f correlated positively with seven drawings (highest coefficient: .29; item numbers in increas-

Table 4. Paintings correlated with appreciation of humor structure

	Paintings (incl. year and artist)	C
$INC\text{-}RES_f$		
.27	Denis Milhomme (1984; "Verzauberte Ruinen")	1
−.30	Friedensreich Hundertwasser (?; "Der gelbe Fluß - die schöne Zungenspitze")	3
NON_f		
.24	Max Ernst (1937; "Triumph der Liebe")	4
.25	Dokupil/Dahn (1982; "Kotzer III")	4
.27	Hanny Lüthi (1973; "Maskentreiben")	4
.31	Salvador Dali (1936; "Femmes aux têtes de fleurs retrouvant sur la plage la peau d'un piano à queue")	4
.36	Félix Vallotton (1917; "Coucher de soleil")	1
.39	Salvador Dali (1931; "Hallucination partielle")	4
NON_a		
.27	Edward Mann (1982; "Braune Seelöwen")	1
−.24	Erich Brauer (1969; "Zwischen Gestern und Heute")	4
−.24	Pablo Picasso (1937; "Frau vor dem Spiegel")	3
−.25	Max Ernst (1937; "Triumph der Liebe")	4
−.35	Salvador Dali (1931; "Hallucination partielle")	4
−.38	Max Ernst (1936; "Landschaft mit keimendem Korn")	4
SPI_f		
.26	Lyonel Feininger (1914; "Umpferstedt I")	3
.28	Salvador Dali (1931; "Hallucination partielle")	4
.29	Pablo Picasso (1937; "Frau vor dem Spiegel")	3
.30	Calder (1973/74; "Gouache")	3
.33	Max Beckmann (1918/19; "Die Nacht")	4
.34	Wassily Kandinsky (1925; "Im Blau")	3
.38	Friedensreich Hundertwasser (?; "Der gelbe Fluß - die schöne Zungenspitze")	3
−.26	John Arthur (1984; "Transzendent")	1
−.27	Richard Akerman (1984; "Reflektionen in Grün ")	1

Note. C = Category in which the painting was placed. 1 = simple-representational; 2 = simple-abstract; 3 = complex-representational; 4 = complex-abstract.

ing order of coefficient size: 6; 36; 43; 50; 9; 78; 31). They were from the complexity subscale and contain a variety of drawings. The only drawing with a negative correlation (No. 7; $r = -.21$) depicted a circle. Structure preference correlated positively with six complex (highest coefficient of .30 by No. 6) and negatively with 13 simple drawings (highest coefficient of .31 by No. 41). A factor analysis of the drawings yielded two clear orthogonal factors of simplicity and complexity and the size of the factor loadings corresponded to the items' correlation with INC-RES ($r = .70$) and NON ($r = .67$; $df = 82$; $p < .001$), respectively.

It appears that for the art photos the NON-complexity association is stronger than the INC-RES-simplicity association, while there is no such difference for the line

drawings of study III. It is not clear whether this is a substantial effect or merely a sample difference. One hypothesis might be that the line drawings can cover the low end of the simplicity-complexity continuum better than art paintings by presenting simple figures like lines, squares, circles, or triangles. It might be of interest for further studies to collect more examples of simple art or also include really kitschy paintings to see whether these provide stronger correlations with INC-RES. Future studies also might study the joint effects of complexity and additional collative variables. The present data suggest that funniness of nonsense correlates best with fantastic complex paintings but less so with representational complex art. This would suggest that collative variables have an *additive* effect in the prediction of humor. Finally, in further support of the view that the overlap between art and humor is mainly due to structural properties of humor, it is noted that SEX_f correlated with only two paintings and two drawings from the BWAS.

Discussion

Taken together, the results from the three studies provide ample support for the interpretation that two of the factors of the taxonomy are primarily structure-dominated. There is little content overlap in liking drawings of a triangle or cross and finding incongruity-resolution humor funny, or experimenting with prism glasses and enjoying nonsense humor. Also, method overlap (for example, rating effects) cannot account for the findings since the effects were not general but specific for type of humor and art class; furthermore, use of ipsative data (which eliminates rating effects) yielded higher, not lower, coefficients. Finally, none of the items of the openness scale deals directly with humor.

Humor appreciation and the five-factor model. While the questionnaire data give only indirect support for the humor-aesthetics relationship, the results of the present study allow us to locate humor appreciation in the five-factor model of personality. As predicted by us 10 years ago (Ruch & Hehl 1987), appreciation of humor structure can be linked with the fifth factor of Openness to experience. While the association between Openness and nonsense appears to be well established, the negative correlation between Openness and funniness of incongruity-resolution humor seems to depend on whether the domain of attitudes/values is represented in the Openness construct (NEO) or not (BFQ). The fact that the structure preference was most highly correlated suggests that irrespective of how *much* individuals appreciate humor, open individuals tend to prefer unresolved or residual incongruity and closed individuals prefer resolvable incongruities. This is underscored by the fact that for the NEO there is no correlation ($r = .00$) between the domain scale of Openness and the sum of funniness ratings of the two humor structures. While the predicted re-

sults were obtained for the mental experience seeking component of sensation seeking and for Openness to experience, it should be noted that the validity of these concepts does not go beyond what was already found for variables like conservatism, intolerance of ambiguity (for INC-RES) and experience seeking (for NON).

Nevertheless, Openness must be considered in the study of humor. Like nonsense, Openness is involved in the production and use of humor. Ruch and Köhler (this volume) report that Openness (in particular the facet of Openness to fantasy, but also Openness to actions and values) is predictive of the quality of humor creation in a cartoon punch line production test. Furthermore, McCrae and Costa (1980) found the responses of open men in a sentence completion task to be characterized by "playful and sometimes odd humor" and McCrae and Costa (1986) found Openness associated with the use of humor as a coping strategy. Finally, in an unpublished study ($N = 102$) we found Openness to be correlated (self-evaluation: $r = .45$, $p < .001$; peer-evaluation: $r = .21$, $p < .05$) with the HBQD measure of reflective (vs. boorish) humor style (Craik et al. 1996). This suggests to study nonsense in concert with these humor measures but also with genuine measures of creativity.

Humor appreciation and collative variables. The present study supports the notion that the enjoyment of different types of humor structure reflects a broader disposition to seek out and enjoy events which offer varying degrees of *stimulus uncertainty*. Furthermore, the results confirm the assumption that no perfect match between structural variables in humor and art is necessary for correlations to emerge, as long as the collative variables used represent the same pole of the dimension of *stimulus uncertainty vs. redundancy*. While the present study provided the best support for the complexity-simplicity dimension, results were also obtained for symmetry vs. asymmetry, but representational vs. abstract modulated the effects of complexity as well. Thus, one might expect effects for further similar dimensions (unambiguous/ambiguous, predictable/unpredictable, consistent/varied, familiar/novel, etc.) as well. While most of the tasks of the present study were reactive in nature, two of them also involved action, namely production of complexity and optimization of visual incongruity.

While the present study gives clear evidence that collative variables do determine individual differences in humor appreciation, the part of the variance accounted for is much below the reliable variance in appreciation of incongruity-resolution and nonsense humor. However, as demonstrated, the zero-order correlations do underestimate the strength of the relationship, and aggregation of predictors (experimental tasks) and criterion (combining funniness and aversiveness) may double the amount of explained variance. One has to consider that the experimental tasks used in the present study do not represent perfect measures of structural features themselves; for example by involving method variance (uncorrelated with humor) or lacking reliability

(for example, preferred complexity was assessed with only *one* matrix pattern, and there was only *one* trial with the prism-glasses). Multiple operationalizations of several collative variables (each reliably assessed) would allow one to determine the real size of the correlation between appreciation of humor structure and art because they should strengthen the desired variance and average out method variance.

Finally, one might also consider matching the type of collative variables by searching for stimuli that also include issues relating to incongruity and various degrees of unresolved ambiguity or incongruity. Such a study was undertaken by Köhler (1993). Using a modified weight-judgment paradigm (WJP; Deckers 1993), Köhler asked 48 students to lift incongruous weights (deviation from a built up expectation). After each of the three experimental trials participants judged the stimulus as well as their own feelings. Funniness of incongruity-resolution correlated positively with the verbal evaluations of perceived funniness ($r = .30$) and felt amusement ($r = .31$) and exhilaration ($r = .31$; all $p < .05$) when lifting the critical weight. While funniness of nonsense was not predictive ($r's = .11$, .07, and .07, respectively), aversiveness was (perceived funniness: $r = .41$; felt amusement: $r = .41$; exhilaration: $r = .46$; all $p < .001$). Thus, the WJP seems to be primarily amusing to those finding unresolved or residual incongruity disturbing and resolvable incongruity enjoyable. Again, the structure-related scores did correlate with a content-reduced task.

Based on the present results for complexity-simplicity of personality, we suggest further studies of appreciation of humor structure in the context of cognitive styles. There are well-established related constructs, such as *integrative complexity* or *conceptual complexity* (Schroeder & Suedfeldt 1971; Tetlok et al. 1993) with a variety of instruments for their assessment. These concepts bear theoretical links with humor and overlap in validity (e.g., the list of BWAS predictors; Gough et al. 1996).

These new findings, together with the ones reviewed recently (see Ruch 1992), allows one to draw a personality picture of individuals' enjoyment of the different humor structures (for the profile of individuals appreciating sexual humor, see Ruch 1992). The high scorer in INC-RES$_f$ is characterized by conservative attitudes and conventional values (as measured by scales of intolerance of minorities, militarism, religious fundamentalism, education to submission, traditional family ideology, capitalism, economic values, value orthodoxy); authoritarianism (punitiveness, intolerance of ambiguity, law and order attitude); general inhibitedness (superego strength, inhibition of aggression, self-control, low sexual permissiveness); conformity (social desirability, lying, low frankness); uncertainty-avoidance (questionnaire measures: need for order, low experience seeking, low aesthetical interests, low complexity, low bohemian unconcernedness; behavioral tests: liking simple-representational paintings, simple line drawings); low depressivity; and older age.

A quite different picture emerges for the high scorer in NON$_f$. Individuals enjoying this kind of humor are characterized by openness to experience/sensation seek-

ing (openness to values, ideas, aesthetics, fantasy, and experiences; mental experience seeking, boredom susceptibility); nonconformity and non-conventional values (low ranking of obedience as a value, low social desirability, high frankness, low value orthodoxy, high ranking of being imaginative as a value); uncertainty-seeking (liking complex-fantastic paintings, complex, asymmetrical, and freehand drawings, complex polygons, producing complexity in black/white patterns, enjoying and enhancing visual incongruity when wearing prism glasses); higher intelligence (fluid intelligence, speed of closure); and younger age.

Interestingly, the two humor structures are partly characterized by the opposite poles of the *same* dimensions (e.g., complexity vs. simplicity) and partly by totally different clusters. For example, incongruity-resolution humor is more related to the domain of *attitudes* and *values*, while nonsense relates to *imagination* and *fantasy*. The involvement of attitudes and values in the INC-RES category is not surprising. The information needed to resolve incongruities is often based on stereotypes; e.g., the closure is provided by "recognizing" that the characters acting are stupid, mean, lazy, etc. Individuals that develop more simple attitudinal systems might have the information providing the resolution more easily available and also enjoy the fit (i.e., the provided support of their value system) more than those lacking such stereotypes. The involvement of fantasy and higher mental ability in nonsense is not striking either. The residual incongruity in nonsense humor often emerges from the fact that there is a more drastic deviation from reality; higher degrees of incongruity can only be obtained and enjoyed if one is able and willing to accept improbable events that are in contrast with one's knowledge of reality and to enter the world of fantasy. These considerations open up the possibility that there might be humor that is specific for different domains of psychic functioning (i.e., some like playing with incongruous ideas, others with values and attitudes, still others with expressive behavior as in pantomime, etc.), and this type of humor is presumably appreciated by those for whom these domains are significant in general.

However, the clustering of variables in the above description was somewhat arbitrary in that the clusters are correlated by themselves. Future studies might concentrate on the *simultaneous* consideration of the different clusters: for example, in how uncertainty-seeking, fantasy and intelligence jointly are involved in enjoying nonsense. Obviously, the consideration of resources and styles are needed and together they will better account for the phenomena than alone.

Open questions - possible future developments

What structural model is most appropriate for humor appreciation data: Do we need to move from uni- to multimodal models? Curiously, against all evidence taxono-

mies of humor are stuck in (serial) unimodal classifications rather than bi- or multimodal models. For example, Freud (1905) first discusses a detailed taxonomy of *joke techniques*, then proceeds to a taxonomy of *tendencies* (i.e., sexual, aggressive, cynical, and skeptical themes). However, since even tendentious jokes have a structural basis (and "harmless" humor has a content), a *bimodal* taxonomy would be more appropriate. This neglect of bimodal thinking in taxonomizing humor stimuli has also been inherent in factor analytic studies which typically attempted to achieve "simple structure", i.e., to place each joke onto one and only one factor. However, if both content *and* structure are important, a joke should have two loadings; one on a structural factor and one on a content factor (as has been found for sexual humor). This is not compatible with conventional exploratory factor analytic procedures but requires target rotations (with each joke having two assignments in the hypotheses matrix), or even better, structural equations modeling techniques.

In other words, as before, in future studies the first step should be a theoretical analysis of thematic *and* schematic properties of the pool of humor items to be taxonomized. In the second empirical step, different structural models should be tested against each other and the one with the best fit should be retained. For example, one model might represent a unimodal taxonomy of jokes according to their content; another unimodal model might represent structural factors only. These and other models might be tested against a bimodal model that simultaneously specifies one (or even more) content and one structure loading for each joke. The empirically derived weights then can tell how important the postulated structural and thematic properties are for a given joke or cartoon. The comparison of models (with the help of goodness of fit indices) will tell whether the common practice of unimodal taxonomies is appropriate or whether other structural assumptions provide a better fit to the data. It might still be that for some jokes the content variance is negligible while others will not load on the structural factors. Here the difference between *intuitive* or *rational* taxonomies of humor (Ruch & Forabosco 1996) and taxonomies based on people's responses to humor becomes apparent: while all jokes have a structure and a content that can be identified and analyzed by an expert, these features might be irrelevant for the everyday recipient of a joke because they may not contribute to perceived funniness.

At this step one should consider doing an even more courageous step into multimodal classification. Attardo and Raskin (1991) proposed a general theory of verbal humor distinguishing among six knowledge resources, suggesting a six-modal taxonomy. The proposed parameters of joke difference were: language, narrative strategy, target, situation, logical mechanism, and script opposition. Once a pool of jokes varying on all dimensions and preclassified on these parameters is available, confirmatory factor analysis could be applied to derive empirical weights for the relevance of the different modes. A failure to verify the importance of one mode (for

the ordinary recipient of jokes) means that this knowledge resource does not affect *differential* appreciation of humor; however, it does not speak against the theoretical significance of that knowledge resource in the morphology of jokes.

Identification of further content classes. So far the present taxonomy of humor appreciation has been very parsimonious. The attempt to identify the *major* sources of variance (setting aside the minor ones) surprisingly did not yield content-related factors of sick, scatological, aggressive/disparagement, ethnic, or black humor; i.e., humor categories emphasized in more intuition-based taxonomies (e.g., Mindess et al. 1985). Confirmatory factor analysis might help to determine how much of the variance in these putative categories is actually due to the content and how much is due to other factors (such as structure or lack of reliability). So far, structure variance overpowered the content variance, but a simultaneous bimodal consideration of these content categories and the structural factors would help to identify those content categories that are worth being considered in the taxonomy as well as the ones which can be neglected. Ideally, in such a study the jokes and cartoons sampled should stem from both structural categories.

One can expect, however, that none of these content categories will be as salient as sexual humor. In an unpublished study, aggressive, black, and scatological humor (using jokes and cartoons based on either incongruity-resolution or nonsense) were presented in addition to jokes and cartoons without a salient content. Structure was again the more dominant factor; i.e., scatological incongruity-resolution humor correlated most strongly with other humor based on incongruity-resolution, and nonsense-based scatological humor correlated with other nonsense humor. Also, the different content categories within a structure were highly intercorrelated and not very distinct from the "harmless" category of the respective structure factor. While at that time it was sufficient to know that none of these content categories yields the salience that sexual content has, now it might be worthwhile to study whether the taxonomy can be expanded by including further content categories.

However, without such a proof, content categories like aggression should be considered to be minor sources of variance in humor appreciation. In the 3 WD jokes and cartoons pre-classified as being aggressive are distributed among the other categories. Also other research groups could not verify such a category, although enough potential representatives were carefully included in the item pool factor analyzed (Herzog & Larwin 1988; Kosuch & Köhler 1989). Furthermore, aggressiveness as a personality trait appeared not to be predictive of 3 WD humor appreciation (see Table 5), although aggressive jokes are represented in all categories. Inhibition of aggression consistently correlated positively with INC-RES$_f$; however, the coefficients were nonsignificant once the effect of conservatism was removed (Ruch & Hehl 1985).

Table 5. Humor appreciation and aggression

	N	$INC\text{-}RES_f$	NON_f	SEX_f	$INC\text{-}RES_a$	NON_a	SEX_a
Spontaneous Aggressiveness							
FAF (Ruch 1980)	110	−.06	−.04	.17	−.04	−.02	.10
FAF (Ruch & Hehl 1985)	49	.13	.03	.11	−.03	−.07	−.06
FAF (unpublished data)	60	−.20	−.20	—	.13	−.06	—
FPI (Hehl & Ruch 1985)	95	−.09	−.01	.13	.06	.13	−.23*
Need for Aggression							
PRF-A (Ruch & Hehl 1993)	108	−.06	−.03	.06	−.02	.11	.05
Self-rating	108	.09	.12	.17	.08	.04	.03
Peer-rating	108	−.02	.09	.12	−.02	−.04	−.13
PRF-A (Ruch & Hehl 1993)	156	.04	.04	.11	.12	.01	.03
Self-rating	156	−.08	−.13	−.02	.12	.06	.09
Peer-rating	156	.03	−.12	−.06	.02	.10	.15
Inhibition of Aggression							
FAF (Ruch 1980)	110	.38***	−.22*	.12	−.03	.21*	.20*
FAF (Ruch & Hehl 1985)	49	.33*	.00	.17	−.11	.18	.15
FAF (unpublished data)	60	.31*	−.06	—	−.09	−.14	—

Note. *N* = sample size; FAF = Freiburger Aggressions-Fragebogen; FPI = Freiburger Persönlichkeits-Inventar; PRF = Personality Research Form.
* $p < .05$; *** $p < .001$.

Disparagement or superiority is a further topic likely not to account for much of the reliable variance in humor appreciation. Unfortunately, studies of disparagement humor do not report the intercorrelation among the humor categories (e.g., anti-male, anti-female humor) studied, nor do they report correlations with appreciation of non-disparagement humor. A simple but convincing demonstration of the relevance of disparagement in differential humor appreciation would be that, for example, there is a *negative* correlation between rated funniness of "American puts down Canadian" humor and funniness of "Canadian puts down American" when computed across a mixed sample of Canadians and Americans. Furthermore, even for the separate groups the correlations between parallel sets of disparagement humor (with the same target) should be much higher than their correlation with funniness of disparagement humor (with different targets) and even much higher with funniness of non-disparaging humor of the same (most likely the incongruity-resolution) structure. No such evidence yet exists.

This does not exclude the possibility that aggression or disparagement does not play a role outside the medium of printed jokes and cartoons. On the contrary, it is very likely that in *natural* interactions individuals (particularly when angered) may create witty remarks that are targeted at somebody and aimed at putting down a dis-

liked person or group. One should not forget that the disparagement theory of "humor" originated as a theory of laughter (the term "humor" had not yet entered the field of the comic at that time) and jokes as a category also did not yet exist. Thus, the original theory was not intended for jokes and cartoons, and hence it is not a disprove of the theory that in canned jokes aggression seems to play a minor role and does not produce interindividual differences in appreciation reliably associated with a trait of aggression.

Revision of the theoretical model. The rationale underlying factor analytic research allows that in an early stage only a tentative interpretation of the factors is made and this model is subsequently refined in further research. The interpretation of the 3 WD factors was undertaken in two steps. The first formulation of the model (Ruch 1980) was only slightly formalized later on (McGhee et al. 1990). Because the hypotheses derived for the personality studies did mostly lead to successful predictions, there was no revision necessary. Meanwhile doubts emerged regarding the plausibility of the two-step (i.e., step I: detection of incongruity; step II: resolution of incongruity) model of humor appreciation in general and we are favoring a three-step model that postulates that after resolving the incongruity, processes at a meta-level start. The recipient is aware that the fit of the solution is an "as if"-fit. What made sense for a moment is then rejected as not really making sense. At a meta-level we experience that we have been fooled; our ability to make sense, to solve problems, has been misused. This third stage then allows to distinguish between joke processing and mere problem solving. If the processes indeed would end with the resolution of the incongruity, we would not be able to distinguish whether we just resolved a problem (as in riddles) or whether we processed humor. We would believe in the outcome of the problem solving activity — that it has truth-value. These ideas can be traced back to theorists of the last century and will be incorporated in a revision of the model (from two-stage to three-stage model) which will be outlined elsewhere in more detail. It should be noted that the predictions for personality studies do not differ much, because the relative amount of sense or fit to no-sense remains different for the two structural factors.

Miscellaneous. A variety of questions are not addressed yet or not answered. For example, we know little about the origins of individual differences in humor appreciation, i.e., to what extent they are due to environmental and heredity factors. For the major predictors of both structural factors (conservatism and sensation seeking) considerable genetic influence has been found; however, the only known twin study of humor appreciation did not reveal much genetic influence (Wilson et al. 1977). Also, little is known about how environmental factors work. While there are strong age-related differences in humor appreciation across the whole life-span (Ruch et al.

1990) it is not known whether they are genuine developmental changes or mere cross-generational cohort differences.

The question whether humor preference can be changed by intervention programs was addressed in a series of masters studies supervised by the second author (Fritsch-Horn 1989; Mönikes 1987; Richter 1986). These studies had a clinical focus, involved patients (coronary heart disease, obesity), were aimed at improving general enjoyment of life and typically lasted about six weeks. The 3 WD was given to participants at the beginning and at the end of the program. Although the general approach underlying the 3 WD is a descriptive one, the nature of the concepts and prior personality studies suggest a clear order of the components as regards psychic and somatic well-being. Worst off were those finding humor aversive; for them humor induces negative rather than positive affect (this coincides with dissatisfaction in different areas, neuroticism, but also a variety of psychosomatic complaints; see Hehl 1990). Laughing at incongruity-resolution humor was considered to be intermediate; while they at least enjoy humor, their enjoyment is contingent on humor making perfect sense and providing complete resolutions. Appreciation of this form of humor goes along with variables such as need for order, intolerance of ambiguity, conservatism, or punitiveness (Ruch et al. 1996). Nonsense is most playful and goes along with openness to experience, liberal attitudes, but also sexual libido. Thus, it was expected that raising people's general well-being will bring changes along these lines. While these treatments brought a reduction of aversiveness of nonsense humor, no increase in funniness of nonsense could be observed. However, programs and were perhaps too short to induce measurable changes.

All in all, while progress has been made in the understanding of this facet of sense of humor, there are still many unanswered questions about appreciation of humor. Humor preference has been considered to be a window to the mind, an objective indicator of personality. Therefore, its study is of value for general personality research. However, it needs to be emphasized that the development of a valid taxonomy of humor appreciation should be seen as an interdisciplinary and cross-national endeavor. Both interdisciplinary research and cross-cultural studies have only begun. Humor research may set a slow pace - but a steady one.

Notes

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